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ABSTRACT

A study examined the attitudes of pre-service secondary teachers toward "writing-to-learn" before and after a compulsory course on language across the curriculum. Subjects, 90 graduates of arts, sciences, social studies, music, business, and physical education programs, recorded their attitudes and understanding of writing to learn at the start of the compulsory 6-week course, developed specific applications of writing activities for their own subject areas, and reported their change in attitudes at the end of the course. The descriptive data indicated that many students had negative or limited views on the role of writing in learning, but that they readily developed ways to incorporate writing into their teaching as the course progressed. Results also indicate that almost without exception, the subjects planned to incorporate writing into their content area teaching. Findings support the conclusions that the subjects were convinced of the value of writing as a means of promoting learning and that some recognized the problems which might inhibit successful implementation of writing to learn. (Fifteen references are attached.) (RS)

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THE ROLE OF WRITING IN SUBJECT-AREA LEARNING

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ABSTRACT

This paper describes a case study of a class of 90 pre-service secondary teachers who were enrolled in a compulsory language-across-the-curriculum course during their professional teacher education program. It describes their attitudes towards writing-to-learn at the beginning and at the end of the course, and presents a variety of specific applications of writing-to-learn in their various content areas.

Writing is envisaged by many as a powerful means of learning. It can help us to remember, to clarify and develop ideas, to order thoughts, to speculate--in other words, to help us think. However, writing is used in school settings for very limited purposes (Applebee, 1981; 1984a). If the potential values of writing are to be achieved in schools, teachers' attitudes towards writing need to change. The purpose of this paper is to describe some of the learnings about writing to learn by a class of pre-service secondary teachers in a variety of subject areas while they were enrolled in a compulsory language-across-the-curriculum course as part of their professional education program.

BACKGROUND

Writing has usually been narrowly conceived in school settings. For the most part, it is used for only two major purposes: for recording information as in note taking or note making, and for evaluative purposes to assess previous learning (Applebee 1981; 1984a). Moffett (1988) claims that

> in one form or another, from first grade through graduate school, (writing) serves mostly to test reading . . . to demonstrate either reading comprehension or the comprehensiveness of one's reading. Because writing produces an external result, it is a natural testing instrument if one wishes to regard it so . . . (p. 73)

Writing, however, can play an important role not merely in <u>demonstrating</u> learning but in <u>facilitating</u> learning in all

subject areas. The role of writing in learning has been stressed by a growing number of advocates over the past fifteen years (Applebee, 1977; Fulweiler & Young, 1982; Marland, 1977; Maimon, 1981; Martin, 1984; Martin, D'Arcy, Newton, & Parker, 1976). Applebee (1984b) suggests that the value of writing as a means of learning may be attributed to some combination of the following factors:

a. The permanence of writing allows the writer to rethink, to revise, and to develop his thoughts over an extended period.

b. The explicitness required in writing forces the writer to sharpen hazy thoughts and perceptions so that they can be put into words.

c. The conventional forms of discourse provide resources for organizing and thinking through new ideas or experiences and for explicating the relationships among them.

d. Writing requires active participation by the writer. (p. 577)

Despite persuasive arguments about the value of writing for learning, available evidence suggests that writing is not easily incorporated into content area classrooms as a means of facilitating learning (Langer & Applebee, 1987). Langer and Applebee conducted a series of case studies of seven experienced content area teachers who were willing and even eager to incorporate writing into their classes. Despite their

experience, their willingness, and the continuing availability of research-team members for consultation and support, results were not, in all cases, as might have been anticipated. While all teachers used new writing activities, only three of the seven changed their views of teaching and learning in substantial ways. The other four had reverted, by the end of the study, to assigning writing mainly for assessment purposes as they had done initially. Failure to change is attributed to a complex interaction of the following influences:

> (a) a model of instruction that defines learning in terms of knowledge to be transmitted, with frequent testing to assess the success of the transmission process; (b) demands for coverage of content in an increasingly overcrowded curriculum; (c) lack of clarity about the value of extended writing experiences as part of the process of mastering the various academic disciplines; and (d) lack of models of how writing activities that require more extended reasoning processes can be embedded within the curriculum. (Applebee, 1984b, p. 590)

Langer and Applebee (1987) emphasize that teachers' evaluation criteria are critical in determining whether or not they are successful in implementing new approaches to writing and learning:

> . . .those who wish to reform education through the introduction of new curricula. . . are unlikely to make fundamental changes in instruction simply by changing curricula and activities without attention to the purposes

> the activities serve for the teacher as well as for the student. . . For (teachers), it is the criteria for judging students' learning that will shape how they implement new approaches. (p. 87)

Certain factors, then, are critically important if writing to learn is to be successfully implemented in classrooms. In particular, teachers must understand writing and its potential role in learning; and, secondly, they must find satisfactory solutions to the problems of finding time, and settling on appropriate and personally satisfactory procedures for response and evaluation. This paper describes some of the things learned by pre-service secondary teachers from a variety of subject areas who were registered in a compulsory language-across-the-curriculum course.

THE STUDY

Participants

The student-participants in this case study of a class were 90 graduates of Arts, Commerce, Home Economics, Fine Arts, Music, Physical Education and Science who were enrolled in a compulsory language-across-the-curriculum course as part of their professional education program. The largest numbers of students, by subject area, were in science (27), social studies (20) and music (15), with smaller numbers in English, modern languages, art, business education, home economics, mathematics, and physical education. The course of studies for the professional education program occupied a full calendar year. When the

language-across-the-curriculum course began in mid-May, the students had already completed a full academic year; they were somewhat weary and would have preferred to be spending time preparing for the jobs they had (or hoped to have) for the following September.

Course Organization

The course was scheduled for three hours a day, four days a week for six weeks in May and June. The 90 students were divided into three separate sections. Each section spent one hour a day for three days each week on writing. There were various other components of the course as well as the writing component, for example, reading, oral language, drama, and language.

Assigned texts for the writing class were Roots in the Sawdust (Gere, 1985) and How Writing Shapes Thinking (Langer & Applebee, 1987). The first of these consists of chapters written by teachers in various subject areas who describe the use of various writing-to-learn activities in their secondary classrooms. The second describes a three-year research study of the uses of writing by content area teachers. Students were required to read the texts and to write journal entries in which they responded to the readings and made applications to their teaching areas.

Lectures in the writing class were short and infrequent. Most class time was spent writing, and on small-group discussion. In-class writing tasks were varied. Sometimes students wrote journal entries responding to some class situation or activity.

They engaged in a variety of writing-to-learn activities adapted from Roots in the Sawdust and other sources (e.g., Tchudi, 1984). An ongoing series of activities involved them in the production of a piece of personal writing which was presented on the last day of class; the set of activities included prewriting of various kinds, sharing writing in small response groups followed by revision, and final oral presentation. Topics for small group discussions were varied. Often the focus was on sharing responses to readings from the text and applications of activities to their teaching.

What They Learned

Several sources of data were available for the following descriptive account of the kinds of learning that occurred during the course. A primary source was journal entries which were written regularly both in and out of class throughout the course. Journals were responded to by the instructor or a graduate assistant on three separate occasions during the six-week period. A second source was the final assignment which asked them to identify specific writing activities that could be used to achieve various affective and cognitive goals in their classrooms. A third source was students' own writing: all students presented a piece of writing on the last day of class; some students included one or more additional pieces in their journals. Three major areas are addressed in the description that follows: a. attitudes and understandings at the beginning of the course; b. specific applications of writing activities for

various purposes in a variety of subject areas; c. students' self-reported attitudes at the end of the course, and, particularly, changes in attitude.

Attitudes at the Beginning

No formal attempt was made to measure students' attitudes at the beginning of the course. However, it was clear from the start that many students wondered why they were required to take a course with an "English Education" designation. Doubts about the relevance of the course were expressed by a number of students in early journal entries written in class on the first or second day.

> How can I use writing in a Math class?
>
> The course seems very vague. I am unclear about how I will find this useful.
>
> I am quite skeptical about the uses of writing in the Art classroom. In my mind anything that is not directly related to producing an art work is a waste of time.

Others who refrained from overt complaint, initially, later admitted the negative or skeptical feelings they brought with them to the course:

> I came in with a rather negative attitude. The course was something I had to "get through."
>
> My impression was that one does not need to learn how to write if one is in Science.
>
> I would never have dreamed of introducing writing into my (music) classes.

I went into Science and Math so I would not have to write.

Many students indicated that they had never thought of using writing in their classes. (I had never given much thought to writing before this session. I suppose that, because I am a science teacher, I felt that writing should be left to the English department.) Others focused on their own writing: some had never done any writing and looked forward to trying; others were anxious about their poor writing skills and did not relish taking what they saw as another English course. Some thought writing important, but had not considered using it in teaching their content area (I've always thought that writing is important especially in relation to thinking and organizing my thought. I just did not know how to bring writing into a science classroom.) Fewer than one quarter of the students--mostly in English and Social Studies--indicated that they had come to the course aware of the value of writing and the purposes it could serve in their teaching.

A majority of students came with relatively narrow concepts of writing. The kinds of writing they imagined their students doing were relatively few in number. Essays, lab reports, and taking or making notes were the most common kinds. Few of them had heard of most of the more than twenty kinds of writing activities mentioned in the course texts. Most viewed writing as a fairly time-consuming activity that should result in a more-or-less carefully phrased, more-or-less correctly spelled product that should be read and evaluated by the teacher as part of the

process of determining the final grade for the course. Some, having discovered during their practicum that students in their classes did what they considered to be appalling writing, applauded an emphasis on writing in all subject areas. (The writing of some of my students was atrocious. . . I found myself constantly correcting grammar and spelling. . . If these students are to learn proper grammar, this must be reinforced throughout the course of their day.)

Applications of Writing to Learn in Various Content Areas

Applications were recorded throughout the course in journal entries and as responses to a final assignment asking students to describe writing activities that could be used for a. affective purposes, and b. to achieve three different kinds of cognitive goals, specifically:

i. to draw on relevant knowledge and experience as a preparation for new learning;

ii. to consolidate and review ideas;

iii. to reformulate and extend knowledge.

This section describes a range of suggestions made by students in various content areas. Sometimes an activity served more than one of the purposes listed above. Ideas suggested were adaptations of ideas presented in class or in the course texts. In some cases, students' own writing is used to illustrate the kinds of writing they hoped to encourage in their students.

Students' comments indicated three common goals for writing for affective purposes:

a. The development of a positive and supportive classroom atmosphere that would invite questioning and sharing.

b. The dissipation of anxiety and the establishment of a trusting teacher-student relationship by permitting expression of likes/dislikes, problems, and concerns.

c. The development of an awareness of the importance of the subject (for example, Math or Science) in society.

Writing tasks most often suggested for achieving purposes a and b above were listing, free writing, and focused writing. Brainstorming and listing at the beginning of a unit--either as individuals or as groups--was seen as a useful tool for building interest, and as a way of showing students what they already know. For example, a Home Economics graduate suggested showing her students a picture of a room and asking them to write for five minutes on whether or not they would be comfortable living there. The activity would serve as an introduction to a unit on elements of housing design by focusing on what the students already knew. Such activities, completed in a supportive atmosphere with all opinions accepted as valid, would, she felt, build confidence, and encourage cooperation, sharing, and questioning.

Free writing--done either in journals or as exit slips (completed at the end of a class), in which students are invited to summarize their learning and/or to comment on problems or difficulties they are having--was seen as a primary means of establishing teacher-student communication and of dissipating

negative feelings. As one student pointed out, the identification and articulation of a problem is often a first step towards solving it. He believed this use of writing would help to create "a classroom climate where students take responsibility for their own learning."

Negative feelings towards some subjects, particularly Math and Science, might be reduced if students were helped to realize how important the subjects are in society. This end might be served by an occasional writing assignment on famous mathematicians, on careers that require a strong background in Math or Science, or on the importance of scientific discoveries. One student suggested that "What if. . ." assignments--for example, "What if antibiotics had never been discovered?"--might help students realize the importance of science.

Listing and focused writing--mentioned above as useful means for helping with affective goals--were also seen as useful in helping students to call on relevant knowledge in preparation for new learning. Zimmerman (in Gere, 1985) describes ways of using list-making in her art appreciation class. Students were asked, for example, to list all the objects in a painting, and later to write a description of the owner of these objects. The listing encouraged students to take time to see the richness of detail of the work, and permitted them to postpone interpretation until they had gathered data through looking and listing. The student teachers in the writing-to-learn class found her suggestions useful for making applications in their own fields.

Music graduates recognized applications that could be made to music. Listing could be used in the music class for descriptions of musical properties, for example, timbre (strings, brass, percussion, woodwinds), tone (piercing, smooth, rich), and colour (bright, sombre, dark). Listing could be used in the music appreciation class to draw a student's attention to the composer's use of such aspects as foreground-background, orchestration, harmonic-melodic development, and form. Another student described how listing could help a student practising a musical instrument to play a difficult passage. After several unsuccessful "runs" at a passage, the student might be encouraged to compose a list of specific difficulties such as the following:

a. tempo too fast

b. fingering problems

c. rhythmic problems

and then to pursue a methodic, gradual solution of the problems thus identified.

A home economics graduate envisaged having each student list all the foods she saw consumed by each person at her table in the cafeteria each day for a week. Using serving-per-person-per-meal as the unit, students would then categorize foods into the four food groups of the Canada Food Guide, determine the average serving per food group per meal, and identify nutritional areas that were deficient.

A science graduate readily saw how listing could be used in a geology class. He would begin a unit by giving small groups of students rock samples representative of the major rock types. Students would be asked to list the similarities among rocks--using their available non-scientific vocabulary--thus beginning the work of categorizing them into types. This activity, he believed, would focus student attention, encourage them to examine the rocks in fine detail, and assure them that they already had relevant and useful knowledge.

Graduates in many subject areas found useful applications for spontaneous, unpolished kinds of writing that captured students' first, undeveloped impressions as a way of activating relevant knowledge in preparation for a new unit. A home economics graduate suggested having students write on why they had dressed as they had on that particular day. Their responses would likely deal with such matters as the image they wanted to project, and the effect of style and fabrics on their feelings of comfort and well being. Such an activity would help students draw on relevant knowledge prior to the introduction of any one of the topics covered in the Clothing and Textiles section of the course.

A music graduate described a focused writing activity he had used during his practicum. Students in a band class were asked to describe a group of dancers who might be dancing to a piece the class was rehearsing. The students described vivid costumes, formal movements and festive atmospheres. Their imaginative

responses helped them to get a feel for the piece. Another music graduate had learned during her practicum experience that analyzing the lyrics of traditional folksongs produced musical results that amazed her. The difference in their singing was clearly noticeable when they understood more about the songs they were singing. She had decided that, for her, band and choir classes would never be devoted solely to rehearsing.

A variety of activities seemed useful to students as a means of reviewing and/or reformulating and extending knowledge. A journal entry by a science graduate reports how a focused writing activity done in class helped him to apply--and hence to extend--his knowledge after observing an in-class demonstration suggested by Hays (1984). The instructor placed two large glass goblets, half filled with a clear liquid, on the table. She sipped liquid from one glass and then from the second. She took an egg, spun it on the table to show that it was fresh, and placed it in one of the goblets. It sank to the bottom. She took a second egg, spun it, and placed it in the second goblet where it floated on the liquid. Without further comment, students were invited to write for five minutes about what they had seen. The science graduate wrote thus about that writing experience:

> Before I started to write, I really did not have a clear explanation of what I observed, so I tried to use the writing to clarify my thoughts. Straight observational notes seemed boring to me. I thought it would be more challenging to try and lay my thoughts out on paper to solve

> the mystery of the demonstration. As it turned out I found myself recording my thoughts and at the same time incorporating my observations. By writing out what I was thinking I could see more clearly what variables I had to deal with, and even channel my thinking to look for more evidence to solve the puzzle. I did finally realize one egg looked much larger, therefore it was in a more dense liquid. The eggs were the same, the liquids different. I'd never really done this before, sit down to write my thoughts out. It was very helpful! Why haven't I done this before?

His own experience readily convinced him that focused writing could be a useful learning activity for his students. A math graduate thought that explaining mathematical algorithms in writing--even such simple things as changing a number from percent to decimal--would be a useful tool in helping students to clarify mathematical procedures.

"What if . . . " questions were seen by many students as a valuable means of encouraging students to reformulate and extend their knowledge. As a physics major suggested, a question like "What if there were no friction?" would cause students to think back to the fundamental principle behind friction and to extend their thinking to a new situation. An extended assignment based on the "What if" formula was the "Create-an-Animal" assignment devised by a biology teacher in Langer and Applebee (1987). Drawing on their recent studies of organ systems and the evolutionary scale, students were asked to "design an animal to

live on land. Start with a chordate that lives in the water and decide what you have to do to get it to live on land" (p. 53). This assignment stimulated a number of similar assignments by students in my class: create an appliance, an electrical system, a molecule, or a mineral. One student suggested that the create-an-animal task could be carried a step further by inviting students to review taxonomy (usually taught at the beginning of the year) by classifying the created animals into taxonomic levels (order, genus, species, etc.) according to the characteristics that the students had made up. "The students might have come up with some pretty bizarre characteristics," she wrote, "but it would be fun for them to act as biologists and take on the problems that early taxonomists faced."

Many of my students responded positively to Watson's (in Gere, 1985) use of "I am . . ." papers. His students in a natural history class had to write, in the first person, about a form of volcanic rock, or a volcanic land form. My students readily adapted this idea to their subject areas. A music graduate would have her students write "I am . . ." definitions, beginning "I am rhythm. . . " or "I am a 3/4 time signature. . ." Another music graduate produced her own "I am . . ." poem:

I am a key signature,
  Standing mostly to the left of the page,
  In a pile of sharps or flats.
    I am the first thing you should notice.
Look closely,

For I predict the piece.

I could be a happy major,

Or sadly minor.

What I say goes.

A sharped F remains sharp,

Unless I say it changes,

And my only enemy is an accidental.

I am

A neat pile of sharps or flats

Sitting squarely on five thin lines.

I am

A key signature

I am. (Barbara Elwood)

Biopoems and **biocrostics** (Gere, 1985) seemed to some to be useful ways of reviewing and consolidating knowledge. A geology major wrote the following biopoem on sand:

Some are white and pretty nifty.

Are always small and kind of sifty.

No two grains are quite the same.

Dancing waves are all to blame. (Dwayne McBeth)

A science major wrote thus about a biopoem on carbon read in class by another student:

> Clive's biopoem on carbon provided a clear summary of the important features of carbon, such as being the foundation of organic chemistry, and its relationship with hydrogen,

oxygen and nitrogen. This is a tidy way of concluding a unit.

Zimmerman (in Gere, 1985) describes an assignment in which students in her art appreciation class had to write a dialogue using two voices, one a gallery owner's, and the other a visitor's. The opening statement was by the visitor who said, "How on earth can this be worth $100,000?" Students had to use the dialogue form to explain the worth of the painting in terms of concepts recently covered in class. Students in my class easily found useful applications of this kind of assignment. A business education graduate would have marketing students write a dialogue for a sales presentation. A music graduate, referring to the controversy about whether Bach would have used the pedal if he had had a modern piano, envisages a dialogue between Bach and a piano salesperson. The dialogue--dealing with the differences in modern pianos that a salesperson could use to intrigue Bach, and reactions which Bach might have--would serve to develop a pianist's understanding of the modern piano and its relationship to earlier keyboard instruments.

Not all students responded positively to the more imaginative kinds of writing. A science graduate, after reading about biopoems, wrote in disgust in his journal, "So now we are supposed to teach them to be poets in Chemistry class?!" Another originally skeptical science student wrote thus about a role play between carbon as a diamond and carbon as graphite, which had been written and presented by a classmate:

At first I thought it was silly, but I realized that if it was so silly, why do I remember it. Role plays are a good way to increase student retention. They focus on an event or an idea, and later it is easier to recall the idea by picturing who were role-playing and what was being said. Also they're fun, and that will make a science classroom a friendlier, less threatening place to be.

The selection of applications presented above illustrates the variety of kinds of writing and the variety of purposes for writing that students found useful.

Attitudes at the End of the Course

One of the most interesting--and rewarding--aspects of the course was reading student comments about significant changes in attitude towards using writing in their classes:

--At first I didn't think it would be possible to incorporate it into a band class. I thought it would be very time consuming and that realistically I wouldn't take the time. I can now see how beneficial it can be and it need only take up 5 minutes of class time.

--In the beginning, I groaned, "I have to take a writing course?" Writing in French just could not be done. . . I have done a complete turnaround.

--My ideas have completely reversed. When I first understood what the course was about I thought, "Great! Another class that fits English and Socials but not my areas of Business and P.E."

--I came into your section thinking that there can't be much use for this stuff in my subject field (Math). I was completely wrong!

--At the beginning of the course I was skeptical how one could incorporate writing into an already crowded curriculum, especially at the senior Chemistry level. I was, however, unable to think of writing that helped students understand the content and processes taught in science. Now I see how writing can be used to facilitate thinking and learning, to teach, consolidate, and extend the curriculum. This is an exciting change of viewpoint because, with this philosophy, one can easily incorporate these activities into even the most rushed and busy time table!

--I have really changed my ideas about teaching music and writing to learn. . . I have always believed in and used writing as a tool for (my own) learning/thinking. But this course has opened my mind up on how I could <u>incorporate</u> this tool into my teaching while maintaining curriculum demands.

They listed numerous specific values that writing could serve: the building of a supportive, cooperative classroom environment; the improvement of attitudes towards the subject; the promotion of higher level thinking; the creation of active, involved learners who would take responsibility for their own learning rather passive recipients of information, predigested and doled out by the teacher:

--I'd never before thought of using writing in Home Ec. Now I can see how using writing would be a great way to develop the thinking skills which I felt I wanted to teach because it was part of our focus, but didn't know how I would teach.

--Writing activities that do not have the teacher in the position of examiner will help reduce anxieties or negative feelings toward a subject . . . They will also serve to give students some access to the teacher.

--What I've realized most about writing is that it actively involves students in the learning process. On practicum, I found that I'd be doing most of the work and they'd be sitting passively absorbing--or daydreaming.

--I did not until now realize how much writing could facilitate the achievement of higher-level cognitive thinking such as synthesis and evaluation.

Almost without exception, they indicated that they planned to use writing--at least to some extent--as a means of promoting learning in their content areas. Nonetheless, several were honest and realistic enough to identify possible problems. Most commonly mentioned was finding time in an already crowded curriculum, a problem raised by 14 of the 90 students. Time to respond to student writing was also mentioned by a few. Other problems mentioned were: finding support in the school environment (The key to the successful application of these ideas, for me, will be support, someone . . . experienced at using these methods (who will) guide and reassure me that I am on

the right path), and expectations by students and administrators (Music rooms are not set up for writing. Students are primed to want to spend their time playing/singing. Schools are looking for performance, success at competitions, etc.).

Responses to problems varied. Three students were not sure that they would use writing-to-learn activities (While writing-to-learn and non-traditional approaches fascinate me, with their seeming simplicity and agreement with my own beliefs about learning, I wonder if I would have the nerve to try them). One had decided that she would postpone implementation (I must admit I am fearful of using any of these techniques in my first year of teaching because I want to establish what I know, while fitting into the typical and expected role of the music teacher, as well as being afraid of having little or no support from my colleagues and principal. I do intend to use this about 2 or 3 years down the line). Most of the students, however, felt that writing could be useful for learning and that they had found ways of trying it in at least one course during their first year.

CONCLUSION

Writing encourages students to think. Putting thoughts into words requires a sharpening and clarification of thought, and often leads to further clarification once thoughts become visible on paper. Yet studies such as Applebee's (1981) suggest that writing activities occupy a minute proportion of school time. There is good reason for believing that activities that require students to memorize and repeat are much more common in

classrooms that approaches that encourage them to think. In his comprehensive, eight-year investigation of America's schools, John I. Goodlad (1984) reports that, in the more than 1000 classrooms visited by his researchers, not even 1 percent of instructional time was devoted to activities that required responses involving reasoning or even opinions from students. His researchers found an extraordinary degree of student passivity. There is little reason for supposing that things are much different in Canada.

It is difficult for students to be passive when they are writing. Responses of pre-service teachers as described above suggest that they were convinced of the values of involving their students in learning by using writing. Some of them also recognized some of the things that might inhibit their use of writing-to-learn. Given the findings of Langer and Applebee (1987) about the difficulty of successfully implementing writing-to-learn in the classroom, ongoing research is needed to determine facts about actual implementation by beginning teachers, along with factors that help and factors that inhibit.

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